

**CALIBRATING  
VOLUMETRIC AIR METERS  
AASHTO T 196**

**1.0 SCOPE**

- 1.1 This method covers the procedures for determining the volume of the bowl of the air meter, the accuracy of the graduations on the neck of the top section of the air meter, and the volume of the calibrated cup.
- 1.2 The equipment calibrated by this procedure will be used to determine the air content of freshly mixed portland cement concrete containing dense, cellular, or light-weight aggregate.

**2.0 REFERENCED DOCUMENTS**

- 2.1 AASHTO Standards
  - M 231 Weighing Devices Used in the Testing of Materials
  - T 19 Unit Mass and Voids in Aggregate
  - T 196 Air Content of Freshly Mixed Concrete by the Volumetric Method

**3.0 APPARATUS**

- 3.1 Balance, M 231, Class G5, readable to 1 gram with accuracy to 2 grams or 0.1% of the sample mass
- 3.2 Thermometer, readable to 0.5°C (1°F) with a range including 15°C to 30°C (59°F to 86°F)
- 3.3 Glass Plate, at least 6 mm (0.25 in.) thick and at least 25 mm (1.0 in.) larger than the diameter of the bowl
- 3.4 Small Glass Plate, approximately 100 mm (4 in.) x 100 mm (4 in.) x 3.2 mm (0.125 in.)

**4.0 PROCEDURE -- VOLUME OF THE BOWL**

- 4.1 Set out sufficient clean water in appropriate container and allow to acclimate to room temperature
- 4.2 Weigh the bowl and glass plate
- 4.3 Fill the bowl with water at room temperature and cover with the glass plate in such a way as to eliminate bubbles and excess water
- 4.4 Weigh the bowl, glass plate, and water
- 4.5 Measure the temperature of the water
- 4.6 Determine the density of water from attached table
- 4.7 Determine the bowl volume by dividing the mass of water by the density of water at the measured temperature

**5.0 PROCEDURE -- CALIBRATION OF GRADUATED NECK**

- 5.1 Assemble measuring bowl and top section of air meter
- 5.2 Fill air meter with water to 8.0% air content gradation

- 5.3 Determine the quantity of water at 21.1°C (70°F) required to fill the air meter to the zero mark
- 5.4 Repeat 5.2 and 5.3 for 6.0% and 4.0% air content

## **6.0 PROCEDURE -- VOLUME OF CALIBRATED CUP**

- 6.1 Weigh the cup and small glass plate
- 6.2 Fill the cup with water at 21.1°C (70°F) and cover with the small glass plate in such a way as to eliminate bubbles and excess water
- 6.3 Weigh the cup, small glass plate, and water
- 6.4 Determine mass of water in cup

## **7.0 TOLERANCES**

- 7.1 Graduated Neck -- divide the quantity of water added to the air meter by the quantity of water needed to fill the bowl and multiply by 100. This value shall be within  $\pm 0.1$  % points of the designated air content
- 7.2 Calibrated Cup -- divide mass of water in cup by mass of water in bowl and multiply by 100. The cup shall have a capacity of  $1.03 \pm 0.04$  % points of the value of the air meter bowl.

**AIR CONTENT OF PLASTIC CONCRETE  
CALIBRATION  
AASHTO T 196  
(VOLUMETRIC METER)**

Air Meter Identification: \_\_\_\_\_

<b>VOLUME OF BOWL</b>	
A. Mass of bowl and glass plate (g)	
B. Mass of bowl, glass plate, and water (g)	
C. Mass of water in bowl = B-A (g)	
D. Temperature of water (°C)	
E. Density of water at measured temperature (kg/m <sup>3</sup> )	
F. Volume of bowl = $1000 \times C / E$ ( ml)	

<b>GRADUATED NECK CALIBRATION</b>			
Quantity of water from 8.0% to 0.0% air voids	ml	$\times 100 \div F =$	%
Quantity of water from 6.0% to 0.0% air voids	ml	$\times 100 \div F =$	%
Quantity of water from 4.0% to 0.0% air voids	ml	$\times 100 \div F =$	%

<b>VOLUME OF CALIBRATED CUP</b>	
G. Mass of cup and glass plate (g)	
H. Mass of cup, glass plate, and water (g)	
I. Mass of water in cup = H-G (g)	
J. Volume of cup = $I / (0.997970 \text{ g/ml})$	
K. Vol. of water in cup $\times 100$ / vol. of water in bowl = $J \times 100 / F$	%

Remarks:

---



---



---



---

Verified by: \_\_\_\_\_

Date: \_\_\_\_\_

Next due date: \_\_\_\_\_

TEMP °C	DENSITY kg/m3	TEMP °C	DENSITY kg/m3	TEMP °C	DENSITY kg/m3	TEMP °C	DENSITY kg/m3
15.6	999.010	19.1	998.377	22.6	997.630	26.1	996.746
15.7	998.993	19.2	998.357	22.7	997.608	26.2	996.720
15.8	998.975	19.3	998.336	22.8	997.585	26.3	996.694
15.9	998.958	19.4	998.316	22.9	997.563	26.4	996.668
16.0	998.940	19.5	998.296	23.0	997.540	26.5	996.642
16.1	998.923	19.6	998.275	23.1	997.516	26.6	996.616
16.2	998.906	19.7	998.255	23.2	997.491	26.7	996.590
16.3	998.888	19.8	998.235	23.3	997.467	26.8	996.562
16.4	998.871	19.9	998.214	23.4	997.442	26.9	996.534
16.5	998.853	20.0	998.194	23.5	997.418	27.0	996.506
16.6	998.836	20.1	998.174	23.6	997.393	27.1	996.477
16.7	998.818	20.2	998.153	23.7	997.369	27.2	996.449
16.8	998.801	20.3	998.133	23.8	997.344	27.3	996.421
16.9	998.784	20.4	998.112	23.9	997.320	27.4	996.393
17.0	998.766	20.5	998.092	24.0	997.294	27.5	996.365
17.1	998.749	20.6	998.072	24.1	997.268	27.6	996.337
17.2	998.731	20.7	998.051	24.2	997.242	27.7	996.308
17.3	998.714	20.8	998.031	24.3	997.216	27.8	996.280
17.4	998.697	20.9	998.011	24.4	997.190	27.9	996.252
17.5	998.679	21.0	997.990	24.5	997.164	28.0	996.224
17.6	998.662	21.1	997.970	24.6	997.138	28.1	996.196
17.7	998.645	21.2	997.947	24.7	997.111	28.2	996.168
17.8	998.627	21.3	997.925	24.8	997.085	28.3	996.140
17.9	998.610	21.4	997.902	24.9	997.059	28.4	996.111
18.0	998.592	21.5	997.879	25.0	997.033	28.5	996.083
18.1	998.757	21.6	997.857	25.1	997.007	28.6	996.055
18.2	998.557	21.7	997.834	25.2	996.981	28.7	996.027
18.3	998.540	21.8	997.812	25.3	996.955	28.8	995.999
18.4	998.520	21.9	997.790	25.4	996.929	28.9	995.971
18.5	998.499	22.0	997.766	25.5	996.903	29.0	995.943
18.6	998.479	22.1	997.744	25.6	996.877	29.1	995.914
18.7	998.459	22.2	997.721	25.7	996.851	29.2	995.886
18.8	998.438	22.3	997.698	25.8	996.825	29.3	995.858
18.9	998.418	22.4	997.676	25.9	996.799	29.4	995.830
19.0	998.398	22.5	997.653	26.0	996.773		